



Document Identifier: DSP1068

Date: 2016-01-12

Version: 1.0.0c

1
2
3
4

5 DHCP Service Management Profile

Information for Work-in-Progress version:

IMPORTANT: This document is not a standard. It does not necessarily reflect the views of the DMTF or its members. Because this document is a Work in Progress, this document may still change, perhaps profoundly and without notice. This document is available for public review and comment until superseded.

Provide any comments through the DMTF Feedback Portal:

<http://www.dmtf.org/standards/feedback>

6 **Supersedes: 1.0.0b**
7 **Document Class: Normative**
8 **Document Status: Work in Progress**
9 **Document Language: en-US**

10

11 Copyright Notice

12 Copyright © 2016 Distributed Management Task Force, Inc. (DMTF). All rights reserved.

13 DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems
14 management and interoperability. Members and non-members may reproduce DMTF specifications and
15 documents, provided that correct attribution is given. As DMTF specifications may be revised from time to
16 time, the particular version and release date should always be noted.

17 Implementation of certain elements of this standard or proposed standard may be subject to third party
18 patent rights, including provisional patent rights (herein "patent rights"). DMTF makes no representations
19 to users of the standard as to the existence of such rights, and is not responsible to recognize, disclose,
20 or identify any or all such third party patent right, owners or claimants, nor for any incomplete or
21 inaccurate identification or disclosure of such rights, owners or claimants. DMTF shall have no liability to
22 any party, in any manner or circumstance, under any legal theory whatsoever, for failure to recognize,
23 disclose, or identify any such third party patent rights, or for such party's reliance on the standard or
24 incorporation thereof in its product, protocols or testing procedures. DMTF shall have no liability to any
25 party implementing such standard, whether such implementation is foreseeable or not, nor to any patent
26 owner or claimant, and shall have no liability or responsibility for costs or losses incurred if a standard is
27 withdrawn or modified after publication, and shall be indemnified and held harmless by any party
28 implementing the standard from any and all claims of infringement by a patent owner for such
29 implementations.

30 For information about patents held by third-parties which have notified the DMTF that, in their opinion,
31 such patent may relate to or impact implementations of DMTF standards, visit
32 <http://www.dmtf.org/about/policies/disclosures.php>.

33 This document's normative language is English. Translation into other languages is permitted.

CONTENTS

35	Foreword	5
36	Introduction.....	6
37	Document conventions.....	6
38	1 Scope	7
39	2 Normative references.....	7
40	3 Terms and definitions	8
41	4 Symbols and abbreviated terms.....	9
42	5 Synopsis.....	10
43	6 Description	10
44	6.1 Class diagram	10
45	6.2 Security aspects of DHCP Service operations	12
46	6.3 Representation of DHCP Service usage data (statistics).....	12
47	7 Implementation.....	13
48	7.1 Representing a DHCP Service	13
49	7.1.1 CIM_DHCPServiceCapabilities	13
50	7.1.2 CIM_ProtocolService.RequestedState	13
51	7.1.3 CIM_ProtocolService.EnabledState	13
52	7.2 DHCP Service access representation	13
53	7.2.1 Relationship with Service.....	13
54	7.2.2 Port for DHCP offer.....	14
55	7.3 DHCP Service default configuration	14
56	9 Use cases.....	17
57	9.1 Profile registration	17
58	9.2 Adding a UDP port for the DHCP Service	17
59	9.3 Obtain DHCP Service configuration	19
60	9.3.1 Determine which IP address versions are supported	19
61	9.4 Obtain DHCP Service statistics	19
62	9.4.1 View default address lease time	19
63	9.4.2 View allocation range and allocated IP Addresses.....	19
64	9.4.3 View all clients who request IP address	19
65	9.4.4 View all clients offered with IP address	20
66	10 CIM Elements.....	20
67	10.1 CIM_DHCPServiceCapabilities	20
68	10.2 CIM_DHCPServiceProtocolEndpoint.....	22
69	10.3 CIM_DHCPServiceSettingData	22
70	10.4 CIM_RemoteServiceAccessPoint.....	24
71	10.5 CIM_RegisteredProfile.....	24
72	ANNEX A (informative) Change log.....	25
73		

74 **Figures**

75	Figure 1 - DHCP Service Management Profile: Class diagram	11
76	Figure 2 – Registered profile.....	17
77	Figure 3 – UDP port configuration to specific interface	18
78		

79 **Tables**

80	Table 1 – Related profiles	10
81	Table 2 – Operations: CIM_ElementCapabilities	15
82	Table 3 – Operations: CIM_ElementSettingData.....	16
83	Table 4 – Operations: CIM_SAPSAPDependency	16
84	Table 5 – Operations: CIM_HostedAccessPoint.....	16
85	Table 6 – Operations: CIM_RemoteAccessAvailableToElement	16
86	Table 7 – CIM Elements: DHCP Service Management Profile	20
87	Table 8 – Class: CIM_DHCPServiceCapabilities.....	20
88	Table 9 – Class: CIM_DHCPServiceProtocolEndpoint.....	22
89	Table 10 – Class: CIM_DHCPServiceSettingData	22
90	Table 11 – Class: CIM_RemoteServiceAccessPoint.....	24
91	Table 12 – Class: CIM_RegisteredProfile	24
92		

93

Foreword

94 The *DHCP Service* Management Profile (DSP1068) was prepared by the Network Services Management
95 Working Group of the DMTF.

96 DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems
97 management and interoperability. For information about the DMTF, see <http://www.dmtf.org>.

98 Acknowledgments

99 The DMTF acknowledges the following individuals for their contributions to this document:

100 Editors:

- 101 • Bhumip Khasnabish - ZTE Corporation
- 102 • ZhongYu Gu – ZTE Corporation
- 103 • Ghazanfar Ali – ZTE Corporation

104 Contributors:

- 105 • Ghazanfar Ali – ZTE Corporation
- 106 • John Crandall – Brocade Communications System
- 107 • ZhongYu Gu – ZTE Corporation
- 108 • Bhumip Khasnabish - ZTE Corporation
- 109 • Lawrence Lamers – VMware
- 110 • John Leung – Intel
- 111 • John Parchem – DMTF Fellow
- 112 • Shishir Pardikar – Citrix
- 113 • Hemal Shah – Broadcom Corporation
- 114 • Eric Wells – Hitachi
- 115 • Alex Zhdankin – Cisco Systems

116

Introduction

117 The information in this specification should be sufficient for a provider or consumer of this data to identify
118 unambiguously the classes, properties, methods, and values that shall be instantiated and manipulated to
119 represent and manage Network Services and the associated configuration information. The target
120 audience for this specification is implementers who are writing CIM-based providers or consumers of
121 management interfaces that represent the component described in this document.

122 Document conventions

123 Typographical conventions

124 The following typographical conventions are used in this document:

- 125 • Document titles are marked in *italics*.
- 126 • ABNF rules are in monospaced font.

127

DHCP Service Management Profile

128 1 Scope

129 The *DHCP Service Management Profile* is a profile that specifies the CIM schema and use cases
130 associated with the general and common aspects of DHCP service management. This profile includes a
131 specification of the DHCP service configuration, DHCP server representation (protocol service, DHCP
132 server protocol end-point), allocated IP address (List) (each IP address represents a client), DHCP server
133 status, and DHCP server statistics. One of the objectives is to facilitate support of IPv4 and IPv6
134 addressing simultaneously.

135 2 Normative references

136 The following referenced documents are indispensable for the application of this document. For dated or
137 versioned references, only the edition cited (including any corrigenda or DMTF update versions) applies.
138 For references without a date or version, the latest published edition of the referenced document
139 (including any corrigenda or DMTF update versions) applies.

140 DMTF DSP0004, *CIM Infrastructure Specification 2.6*,
141 http://www.dmtf.org/standards/published_documents/DSP0004_2.6.pdf

142 DMTF DSP0200, *CIM Operations over HTTP 1.3*,
143 http://www.dmtf.org/standards/published_documents/DSP0200_1.3.pdf

144 DMTF DSP0223, *Generic Operations 1.0*,
145 http://www.dmtf.org/standards/published_documents/DSP0223_1.0.pdf

146 DMTF DSP1001, *Management Profile Specification Usage Guide 1.0*,
147 http://www.dmtf.org/standards/published_documents/DSP1001_1.0.pdf

148 DMTF DSP1033, *Profile Registration Profile 1.0*,
149 http://www.dmtf.org/standards/published_documents/DSP1033_1.0.pdf

150 DMTF DSP1036 *IP Interface Profile 1.1.1*,
151 http://www.dmtf.org/sites/default/files/standards/documents/DSP1036_1.1.1.pdf

152 DMTF DSP1037 *DHCP Client Profile 1.0.3*,
153 http://dmtf.org/sites/default/files/standards/documents/DSP1037_1.0.3.pdf

154 DMTF DSP1097, *Virtual Ethernet Switch Profile 1.1*,
155 http://dmtf.org/sites/default/files/standards/documents/DSP1097_1.1.0.pdf

156 DMTF DSP1116 *IP Configuration Profile 1.0.0*,
157 http://dmtf.org/sites/default/files/standards/documents/DSP1116_1.0.0.pdf

158 GIAC report on DHCP Server Security Audit, 2002,
159 <http://www.giac.org/paper/gcux/27/dhcp-server-security-audit/100392>

160 IETF RFC1208, *A Glossary of Networking Terms*, March 1991,
161 <http://tools.ietf.org/html/rfc1208>

162 IETF RFC1918, *Address Allocation for Private Internets*, February 1996,
163 <http://tools.ietf.org/html/rfc1918>

- 164 IETF RFC2131, Dynamic Host Configuration Protocol, March 1997,
165 <http://tools.ietf.org/html/rfc2131>
- 166 IETF RFC2132, DHCP Options and BOOTP Vendor Extensions, March 1997,
167 <http://tools.ietf.org/html/rfc2132>
- 168 IETF RFC3118, Authentication for DHCP Messages, June 2001,
169 <http://tools.ietf.org/html/rfc3118>
- 170 IETF RFC3315, Dynamic Host Configuration Protocol for IPv6 (DHCPv6), July 2003,
171 <http://tools.ietf.org/html/rfc3315>
- 172 IETF RFC3442, The Classless Static Route Option for DHCPv4, Dec. 2002,
173 <http://www.ietf.org/rfc/rfc3442.txt>
- 174 IETF RFC3633, IPv6 Prefix Options for DHCP version 6, Dec. 2003,
175 <http://tools.ietf.org/html/rfc3633>
- 176 IETF RFC4291, IP version 6 Addressing Architecture, Feb. 2006,
177 <http://tools.ietf.org/html/rfc4291>
- 178 IETF RFC4361, Node-specific Client Identifiers for DHCPv4, Feb. 2006,
179 <http://tools.ietf.org/html/rfc4361>
- 180 IETF RFC6221, Lightweight DHCPv6 Relay Agent, May 2011,
181 <http://tools.ietf.org/html/rfc6221>
- 182 IETF RFC 6603, Prefix Exclude Option for DHCPv6-based Prefix Delegation, May 2012,
183 <http://tools.ietf.org/html/rfc6603>
- 184 IETF RFC6842, Client Identifier Option in DHCP Server Replies, January 2013,
185 <http://tools.ietf.org/html/rfc6842>
- 186 ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards*,
187 <http://isotc.iso.org/livelink/livelink.exe?func=ll&objId=4230456&objAction=browse&sort=subtype>

188 3 Terms and definitions

189 In this document, some terms have a specific meaning beyond the normal English meaning. Those terms
190 are defined in this clause.

191 The terms "shall" ("required"), "shall not", "should" ("recommended"), "should not" ("not recommended"),
192 "may", "need not" ("not required"), "can" and "cannot" in this document are to be interpreted as described
193 in [ISO/IEC Directives, Part 2](#), Annex H. The terms in parentheses are alternatives for the preceding term,
194 for use in exceptional cases when the preceding term cannot be used for linguistic reasons. Note that
195 [ISO/IEC Directives, Part 2](#), Annex H specifies additional alternatives. Occurrences of such additional
196 alternatives shall be interpreted in their normal English meaning.

197 The terms "clause", "subclause", "paragraph", and "annex" in this document are to be interpreted as
198 described in [ISO/IEC Directives, Part 2](#), Clause 5.

199 The terms "normative" and "informative" in this document are to be interpreted as described in [ISO/IEC](#)
200 [Directives, Part 2](#), Clause 3. In this document, clauses, subclauses, or annexes labeled "(informative)" do
201 not contain normative content. Notes and examples are always informative elements.

202 The terms defined in [DSP0004](#), [DSP0223](#), and [DSP1001](#) apply to this document. The following additional
203 terms are used in this document.

204 **3.1**

205 **conditional**

206 indicates requirements to be followed strictly to conform to the document when the specified conditions
207 are met

208 **3.2**

209 **mandatory**

210 indicates requirements to be followed strictly to conform to the document and from which no deviation is
211 permitted

212 **3.3**

213 **optional**

214 indicates a course of action permissible within the limits of the document

215 **3.4**

216 **pending configuration**

217 indicates the configuration that will be applied to an IP network connection the next time the IP network
218 connection accepts a configuration

219 **3.5**

220 **referencing profile**

221 indicates a profile that owns the definition of this class and can include a reference to this profile in its
222 "Referenced Profiles" table

223 **3.6**

224 **unspecified**

225 indicates that this profile does not define any constraints for the referenced CIM element or operation

226 **4 Symbols and abbreviated terms**

227 The abbreviations defined in [DSP0004](#), [DSP0223](#), and [DSP1001](#) apply to this document. The following
228 additional abbreviations are used in this document.

229 **4.1**

230 **IP**

231 Internet Protocol

232 **4.2**

233 **DHCP**

234 Dynamic Host Configuration Protocol

235 **4.3**

236 **UDP**

237 User Datagram Protocol

238 5 Synopsis

239 **Profile name:** DHCP Service Management Profile

240 **Version:** 1.0.0c

241 **Organization:** DMTF

242 **CIM Schema version:** 2.45

243 **Central class:** CIM_ProtocolService

244 **Scoping class:** CIM_ComputerSystem

245 The *DHCP Service Management Profile* is a profile that specifies the CIM schema and use cases
 246 associated with DHCP service management. This profile includes a specification of the DHCP service
 247 configuration, DHCP server representation (protocol service, DHCP server protocol end-point), allocated
 248 IP address (List) (each IP address represents a client), DHCP client (remote service access point), DHCP
 249 server status, and DHCP server statistics.

250 Table 1 identifies profiles on which this profile has a dependency.

251 **Table 1 – Related profiles**

Profile Name	Organization	Version	Requirement	Description
Profile Registration	DMTF	1.0	Mandatory	None
IP Configuration	DMTF	1.0	Mandatory	DSP1116
IP Interface	DMTF	1.1.1	Mandatory	DSP1036
Network Management	DMTF	1.0	Optional	None

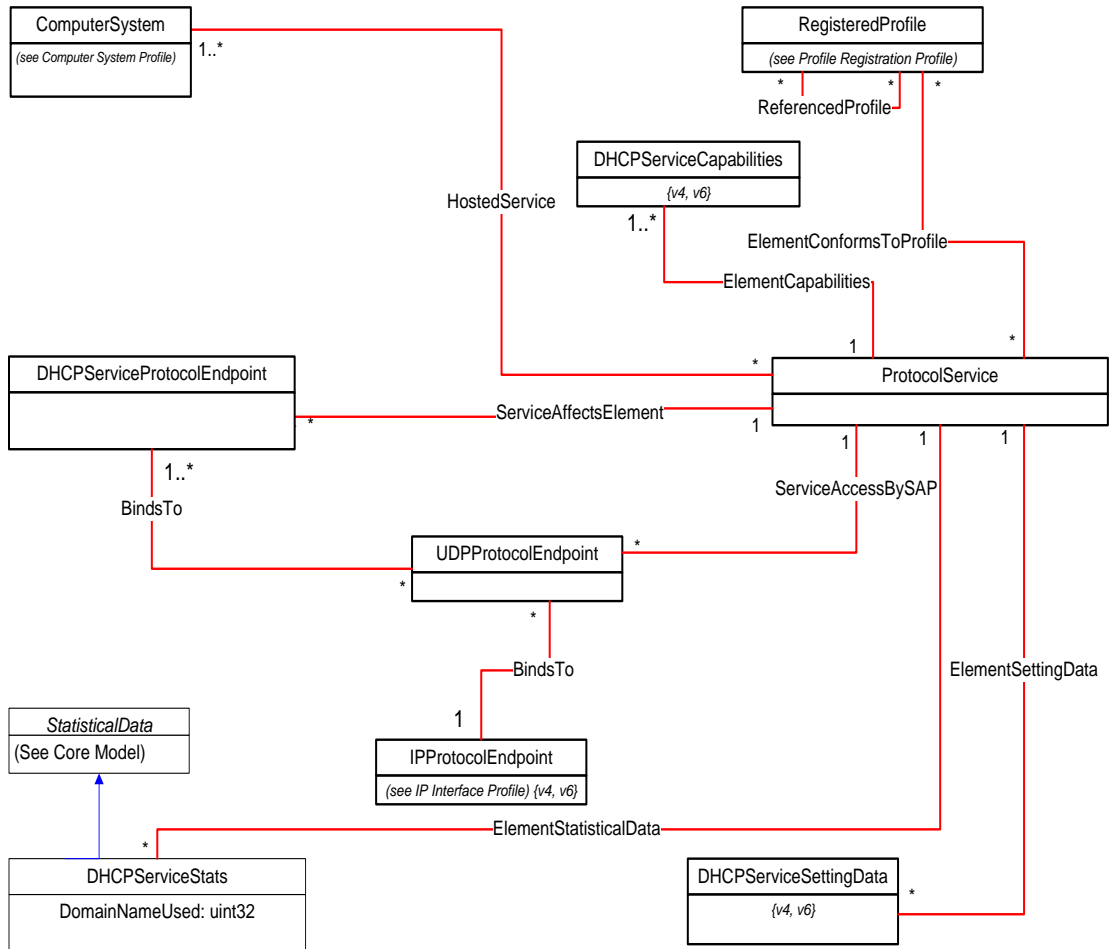
252 6 Description

253 The DHCP Service Management Profile is a profile that will specify the CIM schema and use cases
 254 associated with the general and common aspects of DHCP. This profile includes a specification of the
 255 DHCP service configuration, DHCP server representation (protocol service, DHCP server protocol end-
 256 point, a list of allocated IP addresses with each IP address representing a client), DHCP client (remote
 257 service access point), DHCP server status, and DHCP server statistics.

258 6.1 Class diagram

259 Figure 1 represents the class schema for the *DHCP Service Management Profile*. For simplicity, the CIM_
 260 prefix has been removed from the names of the classes.

261



262
263

264 **Figure 1 - DHCP Service Management Profile: Class diagram**

265 Figure 1 is a class diagram for the DHCP service profile.

266 The following classes are pertinent to represent the management aspects of DHCP service:

- 267 • CIM_DHCPServiceProtocolEndpoint
- 268 • CIM_ProtocolService
- 269 • CIM_DHCPServiceCapabilities
- 270 • CIM_DHCPServiceSettingData

271
272 The DHCP Service is represented by an instance of CIM_ProtocolService. The capabilities of the DHCP
273 Service are represented by an instance of CIM_DHCPServiceCapabilities. The access to the DHCP
274 Service is represented by CIM_DHCPServiceProtocolEndPoint. Each CIM_DHCPServiceSettingData
275 request is resolved via the CIM_ProtocolService.
276

277 DHCP service typically supports the following capabilities:

- 278 • Have a range of IPv4 addresses (per RFC1918) with a starting address and a list of exclusions,
279 if applicable, and assign one to a client
- 280 • Allocate a lease period in hours (default is eight days) for an IP address
- 281 • Default gateway address with specific IPv4 address and no-notify options
- 282 • A list of notify DNS servers (primary, secondary, and none)
- 283 • A list of WINS servers (primary, secondary, and none)
- 284 • A list of Domain names (assigned, specific, and none)

285 DHCP service responds to a DHCP-Discover message from the DHCP Relay Agent or DHCP Client with
286 DHCP-Offer message.

287 DHCP service receives to a DHCP-Request message from the DHCP Bridge or DHCP Client and
288 responds with DHCP-Ack message.

289 Support of IPv4 to/from IPv6 and dual (both IPv4 and IPv6) stack may be desirable and is increasingly
290 becoming the norm.

291 **6.2 Security aspects of DHCP Service operations**

292 There are many authorization and security concerns associated with DHCP Service operation.

293 This Profile does not specifically address the management of the security aspects of DHCP Service.
294 However, these concerns may be addressed via the following practices:

- 295 • Use domain controller based authorization at the first at boot time to verify that the DHCP
296 server's IP address is white-listed.
- 297 • Use pre-authorization and authentication in order to determine which DHCP server may lease
298 IP address to which MAC address holders.
- 299 • Use authentication of DHCP messages per IETF RFC 3118 using either a token-based
300 exchange of messages or a shared symmetric key, which involves additional initial configuration
301 of the DHCP client.
- 302 • Use IPv6 to protect the DHCP traffic; IPv6 has been designed to offer end-to-end security.
- 303 • Routinely audit the database of the DHCP servers in order to verify that only the authorized
304 DHCP clients are leasing addresses from the server (see, for example, the GIAC report on
305 DHCP Server Security Audit, [http://www.giac.org/paper/gcux/27/dhcp-server-security-
306 audit/100392](http://www.giac.org/paper/gcux/27/dhcp-server-security-audit/100392)).

307 **6.3 Representation of DHCP Service usage data (statistics)**

308 The DHCP service (server) usage data may include one or more of the following parameters:

- 309 • Maximum, average, and minimum number of clients served over a specific time period (e.g.,
310 twenty-four hour)
- 311 • Frequency with which the clients renew their leases
- 312 • Up-time (MTTF or mean-time-to-failure), down-time (MTTR or mean-time-to-repair), and
313 sustained overload time of the server

- 314 • Numbers of upstream/downstream servers for which a DHCP server being used as relay and/or
315 bridge server (beyond the scope of this version)
- 316 • Record of failure events and how - in terms of response, response time, and capacity - the
317 clients' requests were handled.
- 318
- 319 The CIM_DHCPServiceProtocolEndpointStats represents statistics of operation of the DHCP Service.

320 7 Implementation

321 This clause details the requirements related to the arrangement of instances and the properties of
322 instances for implementations of this profile.

323 7.1 Representing a DHCP Service

324 Exactly one instance of CIM_ProtocolService shall exist to represent the DHCP service being modeled.
325 The Protocol property of the CIM_ProtocolService instance shall have a value of X (DHCP).

326 7.1.1 CIM_DHCPServiceCapabilities

327 Exactly one instance of CIM_DHCPServiceCapabilities shall exist to represent the capabilities of the
328 DHCP Service. This instance shall be associated with the CIM_ProtocolService instance through an
329 instance of CIM_ElementCapabilities association.

330 7.1.1.1 CIM_DHCPServiceCapabilities.RequestedStatesSupported

331 The RequestedStatesSupported property may contain a combination of zero or more of the following
332 values: 2 (Enabled), 3 (Disabled), or 11 (Reset).

333 7.1.2 CIM_ProtocolService.RequestedState

334 When the CIM_ProtocolService.RequestStateChange() is successfully invoked, the value of the
335 RequestedState property shall be the value of the RequestedState parameter. If the invocation is not
336 successful, the value of the RequestedState property is indeterminate.

337 The CIM_ProtocolService.RequestedState property shall have one of the values specified in the
338 CIM_DHCPServiceCapabilities.RequestedStatesSupported property or a value of 5 (No Change).

339 7.1.3 CIM_ProtocolService.EnabledState

340 When the RequestedState parameter has a value of 2 (Enabled) or 3 (Disabled) and the
341 CIM_ProtocolService.RequestStateChange() has been completed successfully, and the value of the
342 EnabledState property shall be equal the value of the CIM_ProtocolService.RequestedState property. If it
343 has not been completed successfully, the value of the EnabledState property is indeterminate.

344 The EnabledState property shall have the value 2 (Enabled), 3 (Disabled), or 6 (Enabled but Offline).

345 7.2 DHCP Service access representation

346 The access to DHCP Service shall be modeled using at least one instance of
347 CIM_DHCPServiceProtocolEndpoint class.

348 7.2.1 Relationship with Service

349 An instance of CIM_ProvidesEndpoint shall associate the CIM_ProtocolService with the
350 CIM_DHCPServiceProtocolEndpoint.

351 7.2.2 Port for DHCP offer

352 An implementation may model the UDP port to which the DHCP resolution session is bound. When the
353 implementation models the UDP port, the following requirements apply.

354 7.2.2.1 CIM_UDPProtocolEndpoint

355 When the UDP port on which the DHCP resolution session is bound is modeled, the UDP port shall be
356 modeled using an instance of CIM_UDPProtocolEndpoint.

357 7.2.2.2 Relationship to DHCP offer

358 An instance of CIM_BindsTo shall associate the CIM_DHCPServiceProtocolEndpoint instance with the
359 CIM_UDPProtocolEndpoint.

360 7.3 DHCP Service default configuration

361 The default configuration is the configuration of the DHCP service when it was first installed on the
362 managed system. When an implementation exposes the default configuration, the default configuration
363 shall be represented by an instance of CIM_DHCPServiceSettingData associated with the
364 CIM_ProtocolService through an instance of CIM_ElementSettingData, where the IsDefault property of
365 the CIM_ElementSettingData instance has a value of 1 (Is Default).

366 7.3.1 UDP ports

367 An implementation may model one or more UDP ports of the DHCP service. When the implementation
368 models the UDP ports, the following requirements shall apply for each UDP port.

369 7.3.1.1 CIM_UDPProtocolEndpoint

370 There shall be an instance of CIM_UDPProtocolEndpoint in which the PortNumber property of the
371 instance indicates the UDP port number on which the DHCP service is accessible. According to [RFC2131](#)
372 the PortNumber property value will be set to 67.

373 7.3.1.2 Relationship of UDP port to the DHCP Service

374 An instance of CIM_ServiceAccessBySAP shall associate the CIM_ProtocolService instance with the
375 CIM_UDPProtocolEndpoint instance.

376 7.3.1.3 Managing UDP ports

377 The implementation may support managing the UDP ports on which the DHCP service is accessible. The
378 AssignUDPPort() method of the CIM_ProtocolService class can be used to add UDP ports on which the
379 DHCP service will be accessible. Using the RemoveUDPPort() intrinsic operation to remove an instance
380 of CIM_UDPProtocolEndpoint will stop the DHCP service from being accessible.

381 8 Methods

382 8.1 Profile conventions for operations

383 For each profile class (including associations), the implementation requirements for operations, including
384 those in the following default list, are specified in class-specific sub-clauses of this clause.

385 The default list of operations is as follows:

- 386 • GetInstance
- 387 • EnumerateInstances
- 388 • EnumerateInstanceNames
- 389 • Associators
- 390 • AssociatorNames
- 391 • References
- 392 • ReferenceNames

393 **8.2 CIM_DHCPServiceCapabilities**

394 All operations in the default list in 8.1 shall be implemented as defined in [DSP0200](#).

395 NOTE Related profiles may define additional requirements on operations for the profile class.

396 **8.3 CIM_DHCPServiceProtocolEndpoint**

397 All operations in the default list in 8.1 shall be implemented as defined in [DSP0200](#).

398 NOTE Related profiles may define additional requirements on operations for the profile class.

399 **8.4 CIM_DHCPServiceSettingData**

400 All operations in the default list in 8.1 shall be implemented as defined in [DSP0200](#).

401 NOTE Related profiles may define additional requirements on operations for the profile class.

402 **8.5 CIM_RemoteServiceAccessPoint**

403 All operations in the default list in 8.1 shall be implemented as defined in [DSP0200](#).

404 NOTE Related profiles may define additional requirements on operations for the profile class.

405 **8.6 CIM_ElementCapabilities**

406 Table 2 lists implementation requirements for operations. If implemented, these operations shall be
 407 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 2, all operations in
 408 the default list in 8.1 shall be implemented as defined in [DSP0200](#).

409 NOTE Related profiles may define additional requirements on operations for the profile class.

410 **Table 2 – Operations: CIM_ElementCapabilities**

Operation	Requirement	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

411 **8.7 CIM_ElementSettingData**

412 Table 3 lists implementation requirements for operations. If implemented, these operations shall be
 413 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 3, all operations in
 414 the default list in 8.1 shall be implemented as defined in [DSP0200](#).

415 NOTE Related profiles may define additional requirements on operations for the profile class.

416 **Table 3 – Operations: CIM_ElementSettingData**

Operation	Requirement	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

417 **8.8 CIM_SAPSAPDependency**

418 Table 4 lists implementation requirements for operations. If implemented, these operations shall be
 419 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 4, all operations in
 420 the default list in 8.1 shall be implemented as defined in [DSP0200](#).

421 NOTE Related profiles may define additional requirements on operations for the profile class.

422 **Table 4 – Operations: CIM_SAPSAPDependency**

Operation	Requirement	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

423 **8.9 CIM_HostedAccessPoint**

424 Table 5 lists implementation requirements for operations. If implemented, these operations shall be
 425 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 5, all operations in
 426 the default list in 8.1 shall be implemented as defined in [DSP0200](#).

427 NOTE Related profiles may define additional requirements on operations for the profile class.

428 **Table 5 – Operations: CIM_HostedAccessPoint**

Operation	Requirement	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

429 **8.10 CIM_RemoteAccessAvailableToElement**

430 Table 6 lists implementation requirements for operations. If implemented, these operations shall be
 431 implemented as defined in [DSP0200](#). In addition, and unless otherwise stated in Table 6 all operations in
 432 the default list in 8.1 shall be implemented as defined in [DSP0200](#).

433 NOTE Related profiles may define additional requirements on operations for the profile class.

434 **Table 6 – Operations: CIM_RemoteAccessAvailableToElement**

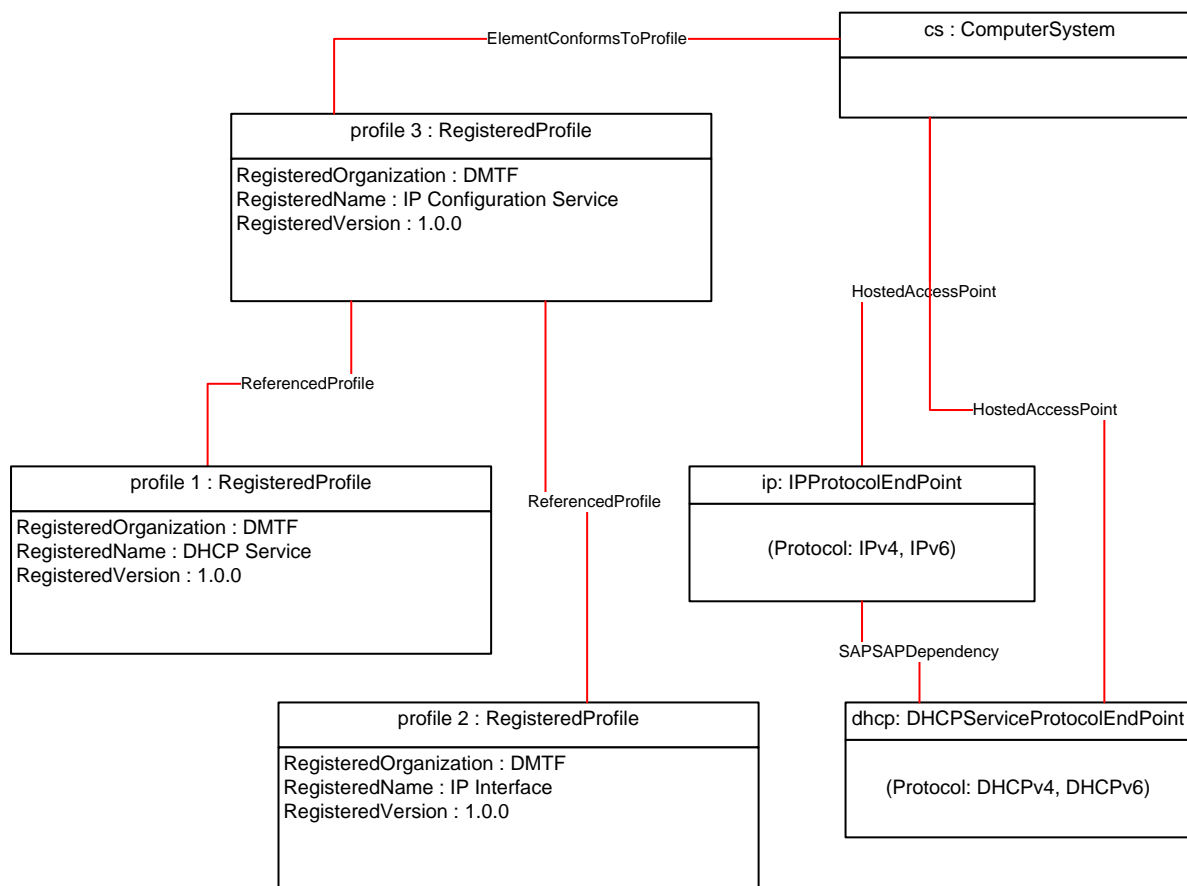
Operation	Requirement	Messages
Associators	Unspecified	None
AssociatorNames	Unspecified	None
References	Unspecified	None
ReferenceNames	Unspecified	None

435 **9 Use cases**

436 This clause contains object diagrams and use cases for the *DHCP Service Management Profile*.

437 **9.1 Profile registration**

438 The object diagram in Figure 2 shows one possible method for advertising profile conformance. The
 439 instances of CIM_RegisteredProfile are used to identify the version of the DHCP Service Management
 440 Profile with which an instance of CIM_ProtocolService is conformant. An instance of
 441 CIM_RegisteredProfile exists for each profile that is instrumented in the computer system. One instance
 442 of CIM_RegisteredProfile identifies the “DHCP service profile1.0.0”. The other instance identifies the
 443 “DHCP Service Management Profile”. The CIM_ProtocolService instance is scoped to an instance of
 444 CIM_ComputerSystem.



445

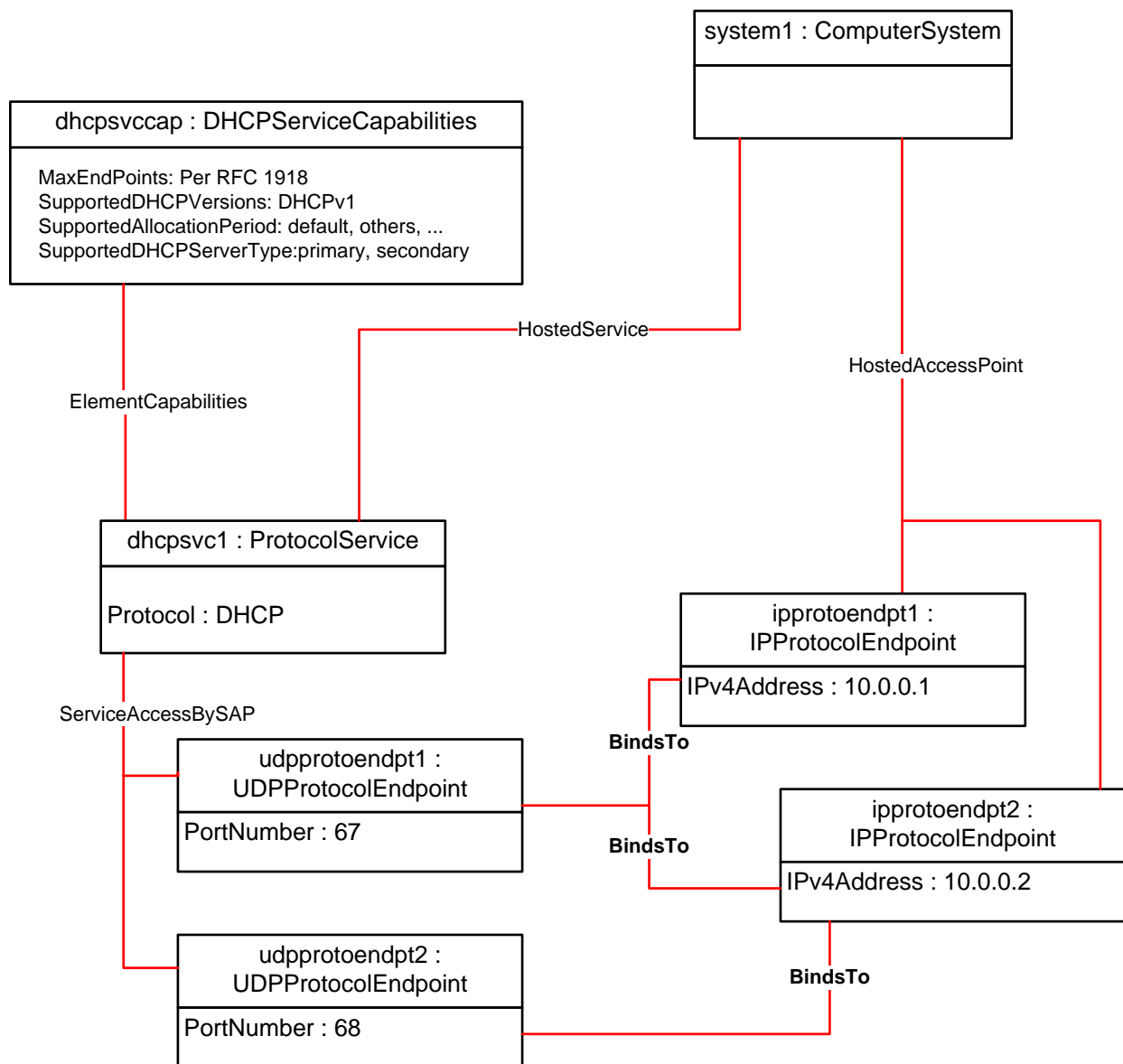
446 **Figure 2 – Registered profile**

447 **9.2 Adding a UDP port for the DHCP Service**

448 An implementation can support adding and removing bindings between the DHCP service and UDP
 449 ports. When an implementation supports adding bindings, a client can configure the service to be
 450 accessible on all interfaces or a specific interface.

451 To have the DHCP service accessible on a UDP port across all IP interfaces of the system, the client can
 452 invoke the AssignUDPPort() method of the CIM_ProtocolService instance, specifying the desired
 453 PortNumber.

454 To have the DHCP service accessible on a UDP port for a specific interface, the client can invoke the
 455 AssignUDPPort() method of the CIM_ProtocolService instance, specifying a reference to the
 456 CIM_IPProtocolEndpoint instance that represents the specific IP interface.



457

458

Figure 3 – UDP port configuration to specific interface

459 Figure 3 reflects the configuration where the AssignUDPPort() method was invoked with the IPEndpoint
 460 parameter containing a reference to ipprotoendpt2 and a PortNumber parameter of 68. The instance
 461 udpprotoendpt2 is created and associated with ipprotoendpt2

462 9.3 Obtain DHCP Service configuration

463 A client may view information about the DHCP server that granted the lease to the DHCP client as
464 follows:

- 465 1) Find all instances of CIM_RemoteAccessAvailableToElement that associate an instance of
466 CIM_RemoteServiceAccessPoint with the CIM_DHCPProtocolEndpoint instance.
 - 467 • If more than one instance exists, find the instance of
468 CIM_RemoteAccessAvailableToElement in which the OrderOfAccess property has the
469 value 1. Find the referenced CIM_RemoteServiceAccessPoint instance.
 - 470 • If exactly one instance exists, find the referenced CIM_RemoteServiceAccessPoint
471 instance.
 - 472 • If no instances exist, no DHCP server is currently modeled for the DHCP client.
- 473 2) View the AccessInfo property of the CIM_RemoteServiceAccessPoint instance.

474 9.3.1 Determine which IP address versions are supported

475 Both version 4 and version 6 of IP address scheme should be supported simultaneously. For IP version 6
476 (IPv6) operations, the client (or device) may use stateless address auto-configuration alternatively. For
477 IPv4 operations, it is desirable to restrict addresses to local network link.

478 View the DHCPTYPE property of the CIM_DHCPServiceCapabilities instance to determine the support for
479 IPv4 (IN-ADDR.ARPA) and IPv6 (IP6.ARPA) addresses.

480 IN-ADDR.ARPA property represents a domain that is defined to look up a record given an IPv4 address.

481 In addition, IP6.ARPA property represents a special domain that is defined to look up a record given an
482 IPv6 address.

483 9.4 Obtain DHCP Service statistics

484 Obtaining and viewing of the DHCP service statistics are discussed in this section. This includes viewing
485 the management of a set of timers for leasing, monitoring-the use-of, monitoring-idle-time, renewing, etc.
486 of the IP addresses that are issued and managed by a DHCP server.

487 9.4.1 View default address lease time

488 This can be viewed by examining the properties of the associated instance of
489 CIM_DHCPServiceSettingData.

490 9.4.2 View allocation range and allocated IP Addresses

491 A client can view the active configuration of the DHCP server as follows:

- 492 a) Find all instances of CIM_ElementSettingData that associate an instance of
493 CIM_DHCPServiceSettingData with the CIM_DHCPServiceProtocolEndpoint instance, and
- 494 b) For each instance of CIM_ElementSettingData, see the value of the IsCurrent property.

495 9.4.3 View all clients who request IP address

496 A client can find the DHCP server IP address as follows:

- 497 a) Find the instance of CIM_DHCPServiceProtocolEndpoint associated with the
498 CIM_UDPProtocolEndpoint through an instance of CIM_BindsTo,

- 499 b) Find the instance of CIM_IPProtocolEndpoint associated with the CIM_UDPProtocolEndpoint
500 through an instance of CIM_BindsTo, and
- 501 c) View the IPv4Address and IPv6Address properties of the CIM_IPProtocolEndpoint instance to
502 find the IP address of the DHCP server.

503 **9.4.4 View all clients offered with IP address**

504 A client can find the DHCP request resolution policy of the DHCP server as follows:

- 505 a) Find the instance of CIM_DHCPServiceSettingData associated with the
506 CIM_DHCPServiceProtocolEndpoint through an instance of CIM_ElementCapabilities, and
- 507 b) View the value of DHCPResolutionPolicy property of the CIM_DHCPServiceSettingData
508 instance to find the DHCP request resolution policy of the DHCP server.

509 **10 CIM Elements**

510 Table 7 shows the instances of CIM Elements for this profile. Instances of the CIM Elements shall be
511 implemented as described in Table 7. Clauses 7 (“Implementation”) and 8 (“Methods”) may impose
512 additional requirements on these elements.

513 **Table 7 – CIM Elements: DHCP Service Management Profile**

Element Name	Requirement	Description
Classes		
CIM_DHCPServiceCapabilities	Mandatory	See 8.2 and 10.1.
CIM_DHCPServiceProtocolEndpoint	Mandatory	See 8.3 and 10.2.
CIM_DHCPServiceSettingData	Mandatory	See 8.4 and 10.3.
CIM_RemoteServiceAccessPoint	Mandatory	See 10.4.
CIM_ProtocolService	Mandatory	See 7.1.
CIM_RegisteredProfile	Optional	See clauses and 10.5 (Table 12).
Indications		
None defined in this profile		

514 **10.1 CIM_DHCPServiceCapabilities**

515 CIM_DHCPServiceCapabilities represents the capabilities of DHCP service as supported and managed
516 by the DHCP server in association with Address Allocation Server (AAS) and DHCP bridge and relay
517 agent if/when applicable. Table 8 contains the requirements for elements of this class

518 **Table 8 – Class: CIM_DHCPServiceCapabilities**

Element Name	Requirement	Description
InstanceID	Mandatory	Key
ElementName	Mandatory	Pattern ".*"
AddressOrigin	Mandatory	This property shall have a value of 4 (“DHCPv4”) or 7 (“DHCPv6”).

Element Name	Requirement	Description
ProtocollFType	Mandatory	This property shall have a value of 4096 (IPv4) or 4097 (IPv6).
DomainType	Mandatory	This property shall have a value of 1 (IPv4/IN-ADDR.ARPA) or 2 (IPv6/IP6.ARPA).
NameServerType	Mandatory	This property indicates role of the server and shall have a value of 1 (Primary name server), (Secondary name server), or 3 (Caching-only name server).
DHCPDiscoverSupport	Mandatory	This property allows the DHCP server to assemble (using configuration file and global options, subnet-specific options, class-specific options, and client-specific options) and respond to Discover message received from a DHCP client (per RFC2131).
DHCPRequestSupport	Mandatory	This property allows the DHCP server to (a) request for an IP address (from the address allocation server or AAS) for a client who sends an empty configuration file over Discover message, and (b) wait for a request from client accepting the configuration and IP address (per RFC2131).
DHCPOfferSupport	Mandatory	This property allows the DHCP server to construct an "offer" message and send it to the client. The message contains a valid IP address and may contain client's configuration (per RFC2131).
DHCPRenewSupport	Mandatory	This property allows the DHCP server process IP address renewal request from a client (per RFC2131).
DHCPACKNACKSupport	Mandatory	This property allows the DHCP server to receive and process ACK (success or process complete) and NACK (negative ACK means process failure) messages from client, bridge and relay agent (per RFC2131).
DHCPAASOptionSupport	Mandatory	This property allows the DHCP server to directly or indirectly (using a separate Address allocation server or AAS) allocate IP address dynamically from a subnet-specific pool (per RFC2131).
DHCPServerManagerOptions	Mandatory	Two options are supported: Global and Generic . Global DHCP options are usually the same for all hosts, e.g., list of DNS name servers and the name of the local domain. Generic DHCP options always override the globally defined option and are defined for sets of subnet, vendor class, user class, and client options (per RFC2131). The allocated IP address can be specific per client's request, a previously used one or random.
DHCPv6OptionsSupport	Optional	DHCPv6 server behavior is as discussed in Sec.17.2, Sec.18.2, and Sec.19.1 of the IETF draft, DHCP for IPv6 (DHCPv6, RFC3315).

519 **10.2 CIM_DHCPServiceProtocolEndpoint**

520 CIM_DHCPServiceProtocolEndpoint represents the DHCP server protocol endpoint (essentially a DHCP
521 client) that is associated with an IP interface. Table 9 contains the requirements for elements of this class.

522 **Table 9 – Class: CIM_DHCPServiceProtocolEndpoint**

Element Name	Requirement	Description
SystemCreationClassName	Mandatory	Key
CreationClassName	Mandatory	Key
SystemName	Mandatory	Key
Name	Mandatory	Key
NameFormat	Mandatory	Pattern ".*"
ProtocolIFType	Mandatory	This property shall have a value of 1 (Other).
OtherTypeDescription	Mandatory	This property shall have a value of "DHCP".
RequestedState	Mandatory	See 7.3.1 of DSP1037
EnabledState	Mandatory	See 7.3.2 of DSP1037
ClientState	Mandatory	See 7.2 of DSP1037
ElementName	Mandatory	Pattern ".*"

523 **10.3 CIM_DHCPServiceSettingData**

524 CIM_DHCPServiceSettingData indicates that the IP configuration should be obtained through the DHCP
525 server if possible. Table 10 contains the requirements for elements of this class.

526 **Table 10 – Class: CIM_DHCPServiceSettingData**

Element Name	Requirement	Description
InstanceID	Mandatory	Key
AddressOrigin	Mandatory	This property shall have a value of 4 ("DHCP") or 7 ("DHCPv6").
ElementName	Mandatory	Pattern ".*"
ProtocolIFType	Mandatory	This property shall have a value of 4096 (IPv4) or 4097 (IPv6).
DomainType	Mandatory	This property shall have a value of 1 (IPv4/IN-ADDR.ARPA) or 2 (IPv6/IP6.ARPA).
IPv6OptionsSupported	Optional	This property shall be set to IPv4/IN-ADDR.ARPA (for DomainType 1) or IPv6/IP6.ARPA (for DomainType 2).
LocalAddressAllocationServer	Mandatory	This property sets the Address Allocation Server (AAS) to run on the same DHCP server.

Element Name	Requirement	Description
RemoteAddressAllocationServer	Optional	If set, this property requires IP address of the remote AAS server in addition to the credential for DHCP server including requirements for authentication to the AAS server.
IPv4AddressRangePool	Mandatory	This property allows setting up of a pool consist of a range of IPv4 addresses. A range is specified by two addresses separated by only a dash (RFC1918).
InitialLeaseTime	Optional	This property allows defining the initial lease reservation time in seconds. The default value is 180 seconds.
InitialLeaseReservationTime	Mandatory	This property allows defining the time in minutes for which an address is reserved while the server offers it to a client. The lease begins when the client accepts the address. This reservation period prevents an address from being offered to more than one client at the same time. The default value is 10 minutes
DefaultLeaseTime	Mandatory	This property allows defining the default lease period in days for the subnet. A value of <i>infinite</i> means that there is no limit.
MaximumLeaseTime	Mandatory	This property allows defining the maximum lease period in days for the subnet. A value of <i>infinite</i> means that there is no limit
LeaseRenewalTime	Mandatory	This property allows defining the lease renewal time in units of 0.1%. For example, a value of 500 indicates that the lease should be renewed after 50% of its lease had expired.
LeaseRebindTime	Optional	This property allows defining the rebind time in units of 0.1%. Option values for a subnet can be assigned within the scope of the subnet definition.
LeaseTimePadding	Optional	This property allows defining the lease padding. This is the amount of extra time the server allocates above the client lease time. It is defined in units of 0.1% of the client lease time. The default value of 10 adds 1% to the client lease time for the server lease time. The DHCP server knows the padded lease in order to preventing the server from assuming that the lease has expired before the client finds it out.
ProbeAddress	Optional	This property allows defining whether an address that is about to be allocated should be tested using <i>ping</i> . By default, this is enabled.
OptionOverload	Mandatory	This property allows defining whether option overloading is allowed. If its value is non-zero, it is allowed. By default it is not allowed.

527 **10.4 CIM_RemoteServiceAccessPoint**

528 CIM_RemoteServiceAccessPoint represents the managed system's view of the DHCP server. Table 11
529 contains the requirements for elements of this class.

530 **Table 11 – Class: CIM_RemoteServiceAccessPoint**

Element Name	Requirement	Description
InstanceID	Mandatory	Key
ElementName	Mandatory	Pattern ".*"
ElementNameEditSupported	Mandatory	See 7.1
MaxElementNameLen	Conditional	See 7.3
OptionsSupported	Mandatory	None
IPv6OptionsSupported	Optional	None

531 **10.5 CIM_RegisteredProfile**

532 CIM_RegisteredProfile identifies the DHCP Server Profile in order for a server to determine whether an
533 instance of CIM_IPProtocolEndpoint is conformant with this profile. The CIM_RegisteredProfile class is
534 DHCP Service Management Profile (DSP1068) defined by the Profile Registration Profile. With the
535 exception of the mandatory values specified for the properties in Table 12, the behavior of the
536 CIM_RegisteredProfile instance is in accordance with the Profile Registration Profile.

537 **Table 12 – Class: CIM_RegisteredProfile**

Element Name	Requirement	Description
RegisteredName	Mandatory	This property shall have a value of "DHCP Service Management Profile".
RegisteredVersion	Mandatory	This property shall have a value of "1.0.0".
RegisteredOrganization	Mandatory	This property shall have a value of "DMTF".

538

ANNEX A
(informative)

539

540

541

542

Change log

Version	Date	Description
1.0.0a	2015-06-19	DMTF Work in Progress
1.0.0b	2015-07-24	DMTF Work in Progress
1.0.0c	2016-01-12	DMTF Work in Progress

543